

### **REMARKS**

This paper responds to the Office Action mailed on July 13, 2006.

Claims 8, 13, 16 and 24 are amended; as a result, claims 8-27 are now pending in this application.

#### **Information Disclosure Statement**

Applicant submitted a Supplemental Information Disclosure Statement and a 1449 Form on April 19, 2006. Applicant notes that the Examiner returned the Form 1449 but did not initial the seven U.S. references. Applicant respectfully requests that an initialed copy of the 1449 form be returned to Applicants' Representatives to indicate that the cited references have been considered by the Examiner.

#### **§103 Rejection of the Claims**

Claims 8-27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. U.S. 6,562,698 to Manor (“Manor ‘698”) in view of U.S. Patent No. 6,420,3245 to Manor (“Manor ‘245”) and further in view of U.S. Published Application No. 2001/0034564 to Jones (“Jones”). Applicants disagree with the stated grounds of rejection and desire to further clarify various distinctions of the present invention over the cited art. Reconsideration of the present application is therefore requested in light of the present amendment and following remarks.

The Examiner has cited the Manor ‘245 reference as pertinent to the patentability of claims in the present application. Manor ‘245 discloses a method and an apparatus for singulating semiconductor wafers. The method includes directing a laser at a layer positioned on the wafer, and absorbing the radiant energy into the layer from the beam to form scribe lines extending across a surface of the wafer. The wafer is then singulated by moving a saw blade along the scribe lines. The Manor ‘245 reference provides that the radiant energy provided to the layer has a relatively short wavelength so that the radiant energy is strongly absorbed in the surface layer, and relatively minimally absorbed by an underlying silicon substrate. (Col. 4, lines 30-34). One suitable laser device that irradiates in the far-infrared region of the spectrum is a

CO<sub>2</sub> laser, which radiates at a wavelength of about 10.6 microns. (Col. 4, lines 35-40). The absorption of the laser radiation is therefore greater for the surface layer than for the underlying silicon substrate material by “about an order of magnitude”. The upper layer of the wafer includes “a combination of passivation layers, dielectrics, oxides nitrides and metal pads.” (Col. 4, lines 15-18). A total thickness of the foregoing combination “is usually less than 20 microns.” The Manor ‘245 reference teaches that the laser is used to remove the surface coatings, and that the improved BSC (“backside chipping”) results from *the removal of all of the coating layers* that typically clog a dicing blade that singulates the wafer. (Col. 6, lines 38-41).

The Applicant therefore understands the Manor ‘245 reference to teach forming scribes in a wafer having a depth of less than 20 microns, since the radiant energy is selected to be strongly absorbed by the surface layer, and relatively minimally absorbed by the underlying silicon.

The Examiner has also cited the Manor ‘698 reference. Manor ‘698 discloses a method for singulating semiconductor wafers by directing first and second laser devices at a substrate that includes a coating layer. With reference to Figure 4A, coating layers 106 are formed on a substrate 100. The layers 106 are “usually about 10 microns thick”. (Col. 5, lines 55-56). Streets 102 are formed in the coating layers by exposing the layers 106 to a first focused laser light 302 having a first wavelength that is preferentially absorbed by the layers 106, as shown in Figure 4B. In Figure 4C, a second focused laser light 332 having a second wavelength that is preferentially absorbed by the substrate material to form a cut 350 in the substrate 100.

Finally, the Examiner has cited the Jones reference. Jones discloses a method for forming a continuous curved edge on a substrate material, and in particular, to a slider employed in a disk drive head by exposing an edge of the slider to laser light. Applicant is generally unclear regarding the specific teaching in Jones that the Examiner relies upon. If the Applicant has missed an important and pertinent teaching in the Jones reference, the Examiner is respectfully requested to point out where the pertinent teaching may be found.

Turning now to the claims, distinguishing differences between the claim language and the prior art will be specifically pointed out. Claim 8, as amended, recites in pertinent part:

“...scribing a workpiece with a laser *to form a scribe having a depth of at least 25 microns...*” (Emphasis added). The applied art, when considered either singly or in combination, simply does not teach this. Manor ‘245 discloses removing relatively thin layers during the scribing process,

which are generally limited to thicknesses that are less than 20 microns. Claim 8 is therefore allowable over the cited art. Claims depending from claim 8 are also now in allowable form, based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 13, as amended, recites in pertinent part: “...scribing a workpiece with a laser along a saw street *to form a scribe having a depth of at least 25 microns...*”. (Emphasis added). Claim 13 is now therefore allowable over the cited art. Again, the prior art, taken either singly or in combination, teaches only forming scribes having a depth of less than 20 microns. Claims depending from claim 13 are also now in allowable form, based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 16, as amended, recites in pertinent part: “...scribing a workpiece with the laser *to form a scribe having a depth of at least 25 microns...*”. (Emphasis added). Again, the applied art, when considered either singly or in combination, simply does not teach this. Manor ‘245 teaches, at most, forming scribes having a depth of less than 20 microns. Claim 16 is now therefore allowable over the cited art. Claims depending from claim 16 are also now in allowable form, based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 24, as amended, recites in pertinent part: “...partially ablating a saw street in the substrate with a laser to form a scribe *having a depth of at least 25 microns...*”. (Emphasis added). Again, the applied art, when considered either singly or in combination, simply does not teach this. Claim 24 is now therefore allowable over the cited art. Claims depending from claim 24 are also now in allowable form, based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

**CONCLUSION**

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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By their Representatives,

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By

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**CERTIFICATE UNDER 37 CFR 1.8:** The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 11 day of September 2006.

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